



INSIGHT

YEAR 12 Trial Exam Paper

2013

FURTHER MATHEMATICS

Written Examination 1

MULTIPLE-CHOICE QUESTION BOOK

Reading time: 15 minutes

Writing time: 1 hour 30 minutes

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of modules</i>	<i>Number of modules to be answered</i>	<i>Number of marks</i>
A	13	13			13
B	54	27	6	3	27
					Total 40

- Students are permitted to bring the following items into the examination: pens, pencils, highlighters, erasers, sharpeners, rulers, one bound reference that may be annotated (can be typed, handwritten or a textbook), one approved graphics calculator (memory DOES NOT have to be cleared) and, if desired, one scientific calculator.
- Students are NOT permitted to bring blank sheets of paper or white out liquid/tape into the examination.

Materials provided

- The Question book of 35 pages, with an answer sheet for the multiple-choice questions.
- A separate sheet with miscellaneous formulas.
- Working space is provided throughout the question book.

Instructions

- Write your **name** in the box provided on the multiple-choice answer sheet.
- Remove the formula sheet during reading time.
- Unless otherwise indicated, diagrams in this book are **not** drawn to scale.

At the end of the examination

- You may keep this Question book.

Students are NOT permitted to bring mobile phones or any other electronic devices into the examination.

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SECTION A – Core**Instructions for Section A**

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions. Choose the response that is **correct** for the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Use the following information to answer Questions 1 and 2.

The numbers of different sized sinkers in a fisherman's tackle box are given in the table below. Sinkers are classified according to their weight.

Sinker weight (g)	Frequency
1	12
2	6
3	6
4	4
6	2
8	1

Question 1

The number of sinkers in the tackle box weighing less than 3 g is

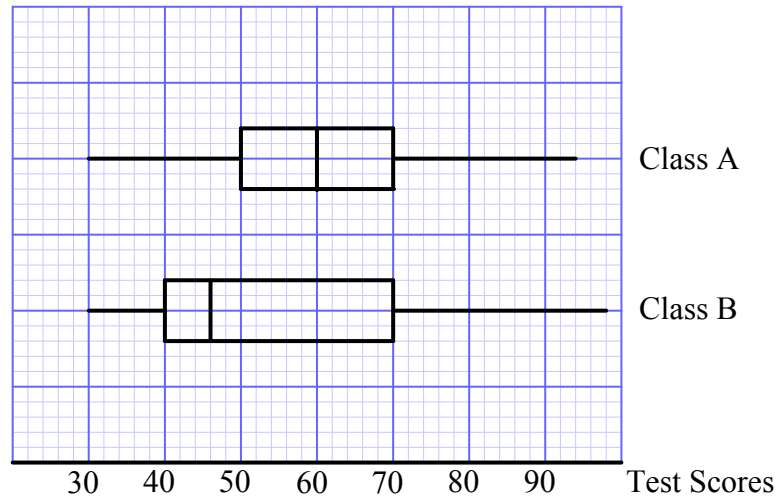
- A. 24
- B. 6
- C. 7
- D. 18
- E. 4

Question 2

Correct to one decimal place, the mean and standard deviation of the weights of sinkers in the tackle box, respectively, are

- A. 2.6 and 1.8
- B. 31 and 1.7
- C. 2.5 and 1.7
- D. 31 and 1.7
- E. 2.5 and 1.8

Question 3



The above boxplots display the test scores of Class A and Class B on a Maths test. There were 20 students in each class. Which of the following statements is **incorrect**?

- A. 10 students in Class A achieved 60 or above.
- B. The highest score came from a student in Class B.
- C. More students achieved below 40 in Class B than in Class A.
- D. 10 students in class B achieved 43 or lower
- E. Class B results were more spread out than Class A results.

Question 4

Ten scores have a mean and standard deviation respectively of 15.3 and 2.6 respectively. If each of the scores is increased by 2, which of the following statements is correct?

- A. the standard deviation remains unchanged
- B. the interquartile range is increased
- C. the range is increased
- D. the mean is decreased
- E. the median remains unchanged

Question 5

The weights of 500 boxes each containing a dozen cream donuts are normally distributed with a mean of 260 g and a standard deviation of 15 g. The number of boxes you would expect to weigh between 245 g and 290 g is closest to

- A. 68
- B. 82
- C. 238
- D. 340
- E. 408

Use the following information to answer Questions 6 and 7.

Data recorded in the table below shows the mean monthly temperature in degrees Celsius (T) and the total monthly rainfall in millimetres (R) on a small farm in southwest Victoria for the 2012 year.

T	25	23	22	21	18	17	16	17	19	19	21	22
R	5	14	34	45	55	65	75	43	35	41	23	12

Assume T is the independent variable.

Question 6

Which of the following statements is true?

- A. $r = 0.895$
- B. The relationship between the variables is strong, positive and linear.
- C. Higher temperatures cause less rainfall.
- D. 80.1% of variation in rainfall can be explained by variation in temperature.
- E. 89.5% of variation in temperature can be explained by variation in rainfall.

Question 7

The equation of the least squares regression line is

- A. temperature = $176.06 - 6.94 \times \text{rainfall}$
- B. temperature = $176.06 - 0.89 \times \text{rainfall}$
- C. temperature = $176.06 \times \text{rainfall} - 6.94$
- D. rainfall = $176.06 + 6.94 \times \text{temperature}$
- E. rainfall = $176.06 - 6.94 \times \text{temperature}$

Question 8

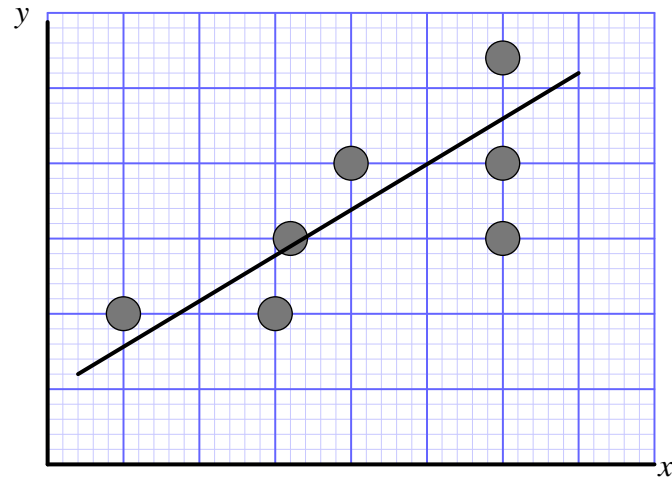
The weights (g) and lengths (cm) of a catch of flathead are recorded and displayed on a scatterplot. The least squares regression equation is found to be

$$\text{weight} = -24.9 + 21.5 \times \text{length}$$

This means that on average there is

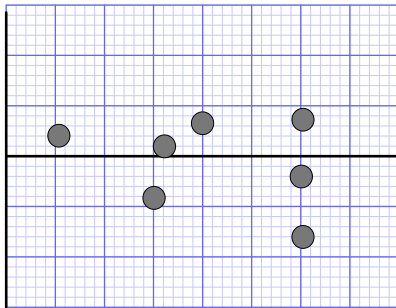
- A.** a 24.9 g decrease in weight for every 1 cm increase in length
- B.** a 21.5 g increase in weight for every 24.9 cm decrease in length
- C.** a 21.5 g increase in weight for every 24.9 cm increase in length
- D.** a 21.5 g increase in weight for every 1 cm increase in length
- E.** a 24.9 g increase in weight for every 1 cm increase in length

Question 9

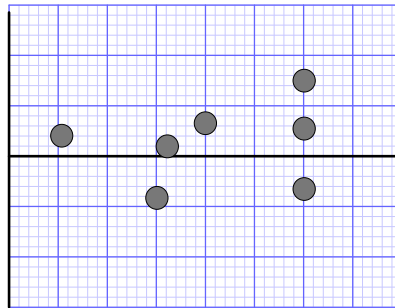


Which of the following could be the residual plot for the above scatterplot?

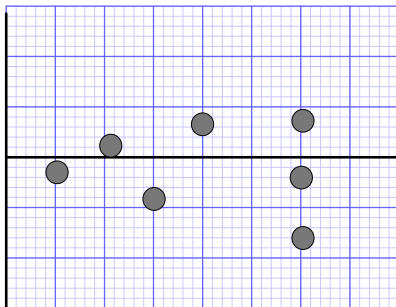
A.



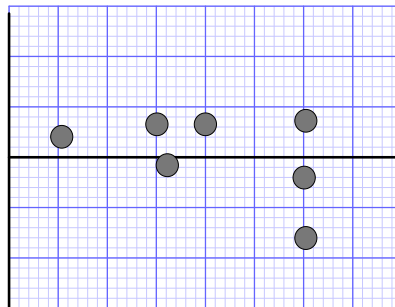
B.



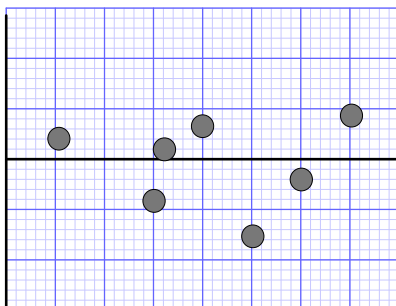
C.



D.



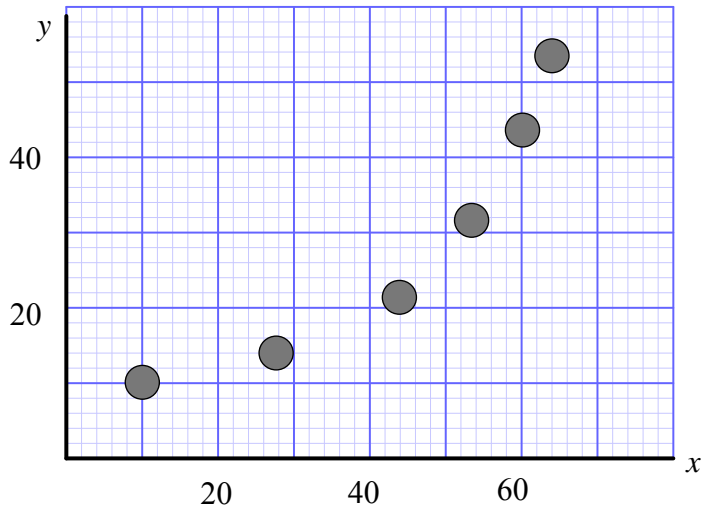
E.



Question 10

A table of bivariate data together with its scatterplot is shown below.

x	10	27	44	53	60	64
y	10	14	21	32	44	54



In order to linearise the data, an x^2 transformation was used. The resulting least squares regression equation of the transformed data is

- A. $y = -3.81 + 0.77 \times x$
- B. $y = 0.77 - 3.81 \times x^2$
- C. $y = -3.81 + 0.77 \times x^2$
- D. $y = 5.54 + 0.01 \times x^2$
- E. $y = 5.54 + 0.01 \times x$

Use the following information to answer Questions 11 and 12.

On Tommy's farm, tomatoes can be grown in a hothouse all year round but production varies from one season to another.

The seasonal indices for some of the seasons are given in the table below.

Season	Summer	Autumn	Winter	Spring
Seasonal Index	1.25	1.10		0.99

Question 11

The seasonal index for winter is

- A.** 0.66
- B.** 1.66
- C.** 1.99
- D.** 0.99
- E.** 1.00

Question 12

Tommy calculated the deseasonalised summer production figure to be 1500 tonnes. The actual summer production figure would have been

- A.** 1200
- B.** 1650
- C.** 1875
- D.** 1364
- E.** 1500

Question 13

The table below shows the temperatures for 7 consecutive days during January 2012.

Day	1	2	3	4	5	6	7
Temp	25	27	29	37	41	21	23

The four-point moving median with centring temperature for day 4 is closest to

- A. 29
- B. 33
- C. 36
- D. 37
- E. 39

END OF SECTION A
TURN OVER

SECTION B**Instructions for Section B**

Select **three** modules and answer **all** questions within the modules selected on the answer sheet provided.

Indicate the modules you are answering by shading the matching boxes on your multiple-choice answer sheet.

Choose the response that is **correct** for the question.

One mark will be awarded for a correct answer; no marks will be awarded for an incorrect answer.

Marks **are not** deducted for incorrect answers.

No marks will be awarded if more than one answer is completed for any question.

Module	Page
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Module 1: Number patterns**Question 1**

The second term of an arithmetic sequence is 7 and the fourth term is 1. What is the first term?

- A. 4
- B. 7
- C. 8
- D. 10
- E. 15

Question 2

For the arithmetic sequence 3, 7, 11, 15, the 15th term is

- A. 15
- B. 19
- C. 55
- D. 59
- E. 63

Question 3

Which one of the following sequences is a geometric sequence?

- A. -9, -3, 3, 9, 15
- B. -9, -3, -1, $-\frac{1}{3}$, $-\frac{1}{9}$
- C. 1, 3, -6, 9, -18
- D. 1, 1, 2, 4, 8
- E. $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{9}$, $\frac{1}{12}$, $\frac{1}{15}$

Question 4

Simon undertook a training regime to improve his fitness. On day one he did 20 push-ups. He increased the number of push-ups he did by the same number each day. After 7 days he had completed 392 push-ups. The number of push-ups he did each day was increased by

- A. 8
- B. 9
- C. 10
- D. 11
- E. 12

Question 5

A water tank is full after a heavy downpour and holds 3000 L of water. The tap is dripping and after one day 100 L has leaked out. On the second day 95 L leaks out and on the third day 90.25 L leaks out. If the tank continues to leak indefinitely, the amount of water that remains in the tank will be

- A. 0 L
- B. 500 L
- C. 1000 L
- D. 1500 L
- E. 2000 L

Question 6

A farmer was trying to increase his sheep population. Each year his stock increased in number by 80% of the number he had in the previous year, due to breeding. He also purchased 50 new sheep each year. A difference equation which describes this situation is

- A. $r_{n+1} = 1.8r_n + 50, r_1 = 50$
- B. $r_{n+1} = 0.8r_n + 50, r_1 = 50$
- C. $r_{n+1} = 0.8r_n, r_1 = 50$
- D. $r_{n+1} = 0.8r_n \times 50, r_1 = 50$
- E. $r_{n+1} = 1.8(r_n + 50), r_1 = 50$

Question 7

A new car was purchased on 1 January 2012 for \$55 000. The car depreciates by 15% each year and the price is adjusted on 1 January each year. On which date will the car be valued below \$20 000 for the first time?

- A. 1 January 2017
- B. 1 January 2018
- C. 1 January 2019
- D. 1 January 2020
- E. 1 January 2021

Question 8

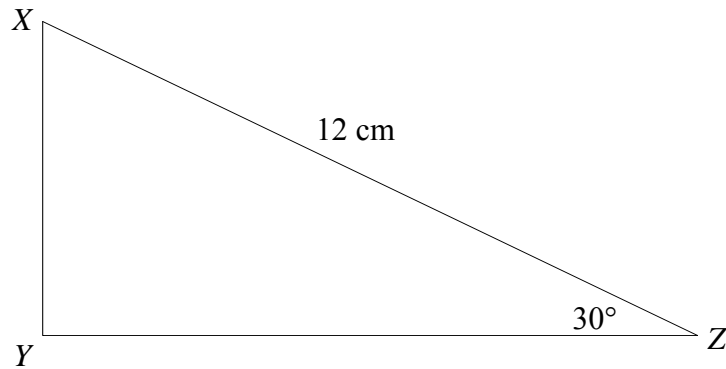
If the sum of the first 5 numbers in an arithmetic sequence is 25 then

- A. the common difference must be positive
- B. the common difference must be negative
- C. the first term must be positive
- D. the last term must be positive
- E. the 3rd term must be positive

Question 9

The 5th term (t_5) of a sequence where $t_{n+2} = t_{n+1} - 4t_n$, and $t_1 = 1$ and $t_2 = 3$, is

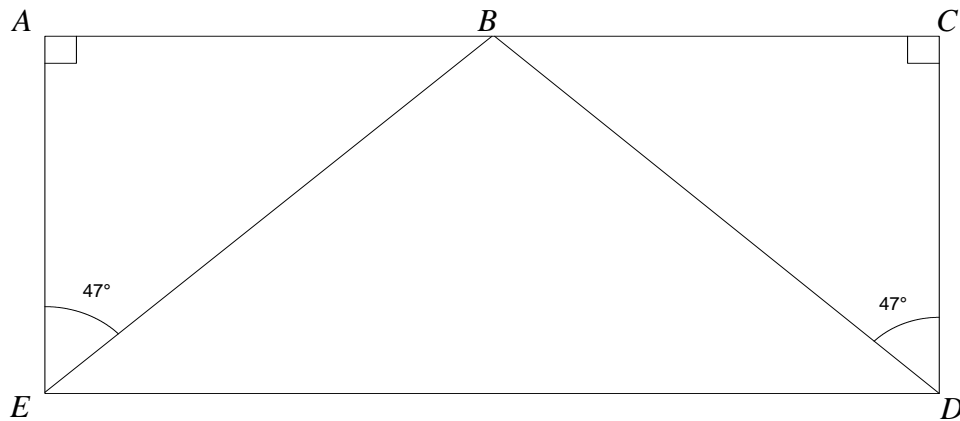
- A. -1
- B. -13
- C. 9
- D. 5
- E. -9

Module 2: Geometry and trigonometry**Question 1**

Using the information in the above diagram, the length of XY is

- A. 6 cm
- B. 7 cm
- C. 8 cm
- D. 9 cm
- E. 10 cm

Use the following information to answer Questions 2 and 3.



$ACDE$ is a rectangle with dimensions 8.58 m by 4.00 m. EBD is an isosceles triangle.

Question 2

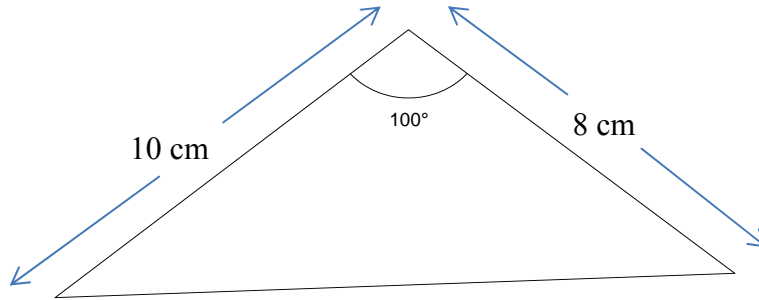
The length of BE is closest to

- A. 4 m
- B. 5 m
- C. 6 m
- D. 7 m
- E. 8 m

Question 3

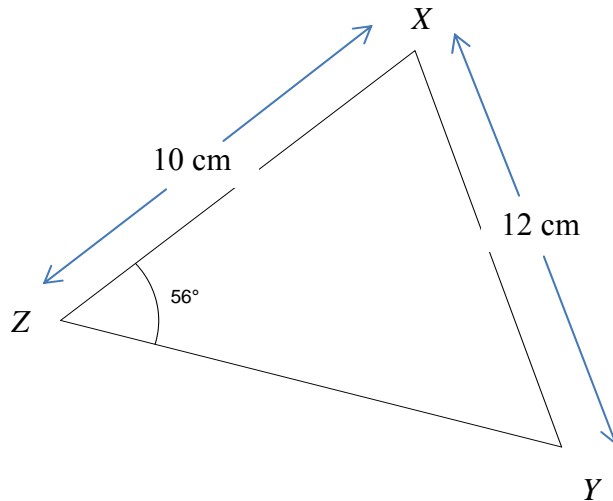
The ratio of the area of triangle BDE to the area of the rectangle $ACDE$ is

- A. 1:1
- B. 1:2
- C. 2:1
- D. 8.58:4
- E. 4:8.58

Question 4

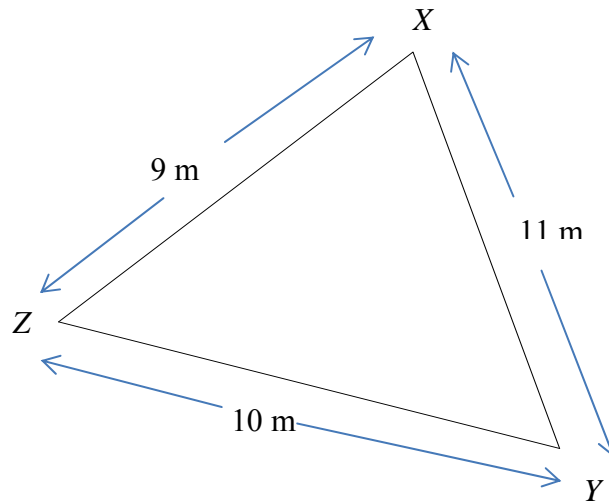
Using the information in the above diagram, the area of the triangle is closest to

- A. 80 cm^2
- B. 79 cm^2
- C. 40 cm^2
- D. 39 cm^2
- E. 10 cm^2

Question 5

Using the information in the above diagram, angle XYZ is closest to

- A. 81°
- B. 80°
- C. 56°
- D. 43°
- E. 44°

Question 6

Using the information in the above diagram, angle XYZ is closest to

- A. 50.47°
- B. $50^\circ 28' 44''$
- C. 50°
- D. $50^\circ 28' 43''$
- E. 51°

Question 7

A bucket in the shape of a cylinder holds a certain volume of water. Another bucket is twice as high and has a radius of 3 times the radius of the smaller bucket. Which of the following statements is true?

- A. The larger bucket holds 2 times the volume of the smaller bucket.
- B. The larger bucket holds 3 times the volume of the smaller bucket.
- C. The larger bucket holds 4 times the volume of the smaller bucket.
- D. The larger bucket holds 9 times the volume of the smaller bucket.
- E. The larger bucket holds 18 times the volume of the smaller bucket.

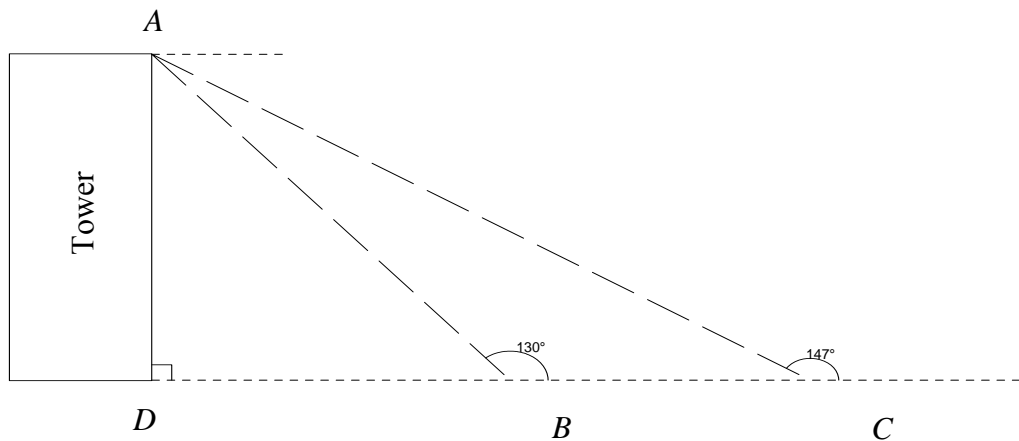
Question 8

An ant walks 72.54 mm on a bearing of 56°T to point B . It then turns and heads on a bearing of 135°T and walks 77.78 mm to point C . The bearing the ant needs to walk on to return to where it started (A) is closest to

- A. 116.04 mm
- B. 277°T
- C. 038°T
- D. 083°T
- E. 308°T

Question 9

Two wires are connected to the top of a tower at the same point (A) and also to two points on the ground (B and C) which are in a straight line away from the tower. The angles the wires make with the ground are 130° and 147° respectively.



The ratio of the length $DC:DB$ is closest to

- A. 1.81:1
- B. 1.82:1
- C. 1.83:1
- D. 1.84:1
- E. 1.85:1

Module 3: Graphs and relations**Question 1**

The equation of the straight line joining the two points $(-2, 6)$ and $(3, 1)$ is

- A. $x - y = 4$
- B. $x + y = 4$
- C. $x - y = -4$
- D. $x - y = 0$
- E. $x + y = 0$

Question 2

For the pair of simultaneous equations, $y + 2x = -4$ and $3y = 2x + 4$, the solution is

- A. $(-2, 0)$
- B. $(2, 0)$
- C. $(0, -2)$
- D. $(0, 2)$
- E. $(-2, 2)$

The following information relates to Questions 3 and 4.

Jack and Jill entered an endurance bike race around Mount Bighill. They start and finish at the same point. Some sections are hilly and their speed changes.

Distance from start/finish (km)



Question 3

Their average speed for the first 5 hours is

- A. 3 km/h
- B. 14 km/h
- C. 20 km/h
- D. 40 km/h
- E. 70 km/h

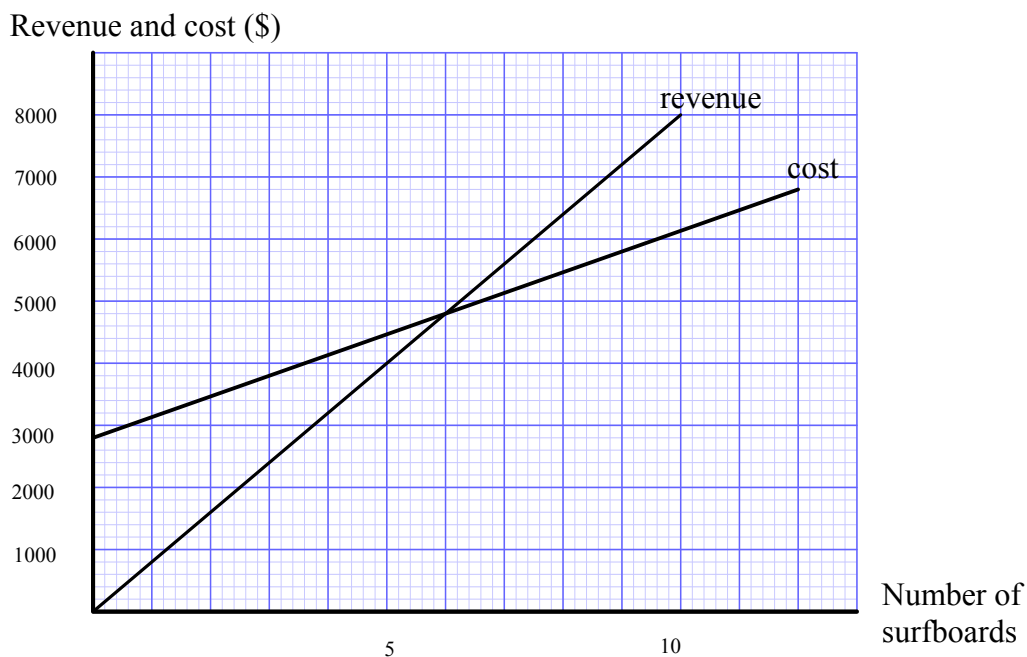
Question 4

Jack and Jill were riding fastest between

- A. the start and the 1st hour
- B. the 1st hour and the 2nd hour
- C. the 2nd hour and the 5th hour
- D. the 9th hour and the 10th hour
- E. the 10th hour and the 12th hour

The following information relates to Questions 5 and 6.

Graphed on the axes below are the cost and revenue functions for the monthly manufacture and sale of surfboards for the Quickcurl surfboard company.



Question 5

The number of surfboards required to be made and sold to break even and the total cost of making this number of surfboards respectively are

- A. 0 and \$2800
- B. 5 and \$2800
- C. 6 and \$2800
- D. 6 and \$4400

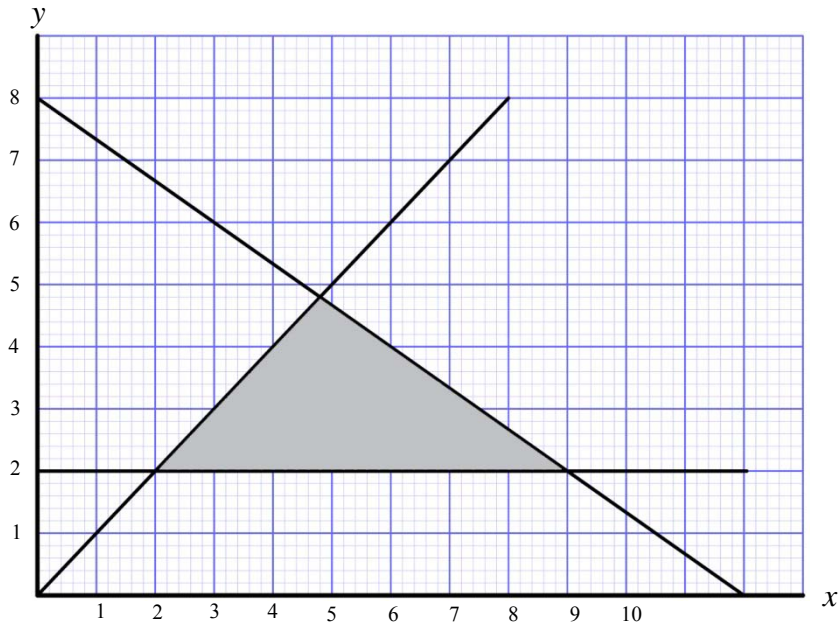
Question 6

Which one of the following statements regarding the Quickcurl surfboard company is **false**?

- A. The cost of making 0 surfboards is \$2800.
- B. Surfboards are sold for \$800.
- C. If they make and sell 10 surfboards they will make \$2700 profit.
- D. Quickcurl surfboard company always sells at least 6 surfboards.
- E. For each extra board made, costs increase by about \$333.

Question 7

The set of inequations which describes the shaded region below is



- A.** $y \geq 2$
 $y \leq x$
 $3y + 2x \leq 24$
- B.** $y \geq 2$
 $y \geq x$
 $3y - 2x \leq 24$
- C.** $y \geq 2$
 $y \leq x$
 $3y - 2x \leq 24$
- D.** $y \geq 2$
 $y \leq x$
 $3y + 2x \geq 24$
- E.** $y \leq 2$
 $y \leq x$
 $3y - 2x \geq 24$

Question 8

Two different tomato fertilisers, Growfast (G) and Bigleaf (B), supply different amounts of nitrogen and phosphorus per kilogram as outlined in the table below.

Fertiliser	Units of nitrogen per kg	Units of phosphorus per kg
Growfast (G)	50	20
Bigleaf (B)	30	50

The tomato grower must purchase at least as much Growfast as Bigleaf. He needs to purchase at least 2000 units of nitrogen and 3000 units of phosphorus. If g represents the number of kilograms of Growfast purchased and b represents the number of kilograms of Bigleaf purchased then the constraints which describe this situation are

- A. $g \leq b$
 $50g + 20b \geq 2000$
 $30g + 50b \geq 3000$
- B. $g \leq b$
 $50g + 30b \geq 2000$
 $20g + 50b \geq 3000$
- C. $g \geq b$
 $50g + 30b \geq 2000$
 $20g + 50b \geq 3000$
- D. $g \geq b$
 $50g + 20b \geq 2000$
 $30g + 50b \geq 3000$
- E. $g \leq b$
 $50g + 30b \leq 2000$
 $20g + 50b \leq 3000$

Question 9

When the x and y values in the table below are plotted the resulting graph is non-linear.

x	0.020	0.025	0.033	0.050	0.100
y	2	4	6	8	10

The data could best be linearised by plotting y against

- A. x^2
- B. x^3
- C. $\frac{1}{x}$
- D. $\frac{1}{x^2}$
- E. $\log_{10} x$

Module 4: Business-related mathematics**Question 1**

Bob purchased a new fishing rod for \$148.50. A 10% GST had already been added to the price. The price before GST was added was

- A. \$133.65
- B. \$163.35
- C. \$135.00
- D. \$141.08
- E. \$14.85

Question 2

\$8000 is invested in a simple interest account which earns interest at a rate of 4.5% per annum. The amount of interest earned in the first 3 years is

- A. \$1080.00
- B. \$10.80
- C. \$9080
- D. \$360
- E. \$450

Question 3

A surfboard is discounted by 15% at the end of summer in the February sale. In the April autumn sale it is reduced by a further 10% of its February sale price. It was still unsold at the end of June so it was discounted by another 10% of its autumn sale price and was listed at \$750. Its original price before any discounts was closest to

- A. \$1154
- B. \$1044
- C. \$488
- D. \$1090
- E. \$1013

Question 4

Georgia invests \$12 000 for 5 years at an interest rate of 7.5% per annum compounding each month. The value of Georgia's investment after 3 years is closest to

- A. \$14 700.00
- B. \$15 017.35
- C. \$5439.53
- D. \$14 907.56
- E. \$17 439.53

Question 5

A bank statement for the months of July to September 2011 is shown below.

Date	Transaction details	Credit	Debit	Balance
01 Jul 2011	Opening Balance			2800.00
15 Jul 2011	Withdrawal		350.00	2450.00
15 Aug 2011	Deposit	1200.00		3650.00
18 Aug 2011	Withdrawal		350.00	3300.00
23 Sep 2011	Withdrawal		100.00	3200.00
30 Sep 2011				

The interest on this account is calculated at the end of each month on the minimum monthly balance at the rate of 3.5% per annum. For this account, the interest for 1 July 2011 to 30 September 2011 is to be paid on 30 September 2011.

The balance after this interest payment will be

- A. \$3223.63
- B. \$3483.50
- C. \$3495.75
- D. \$3499.25
- E. \$3457.25

Question 6

Elwood invests \$480 000 in an annuity which earns interest calculated monthly at the rate of 4.8% per annum. The annuity will last for 20 years. Each month he will receive

- A. \$25 020.74
- B. \$41 047.61
- C. \$3115.00
- D. \$23 040.30
- E. \$2000.00

Question 7

Anton buys a car with a price of \$23 000. He agrees to pay a \$3000 deposit and monthly repayments of \$1000 per month for 3 years. The effective interest rate is

- A. 26.7%
- B. 45.1%
- C. 53.3%
- D. 23.2%
- E. 51.9%

Question 8

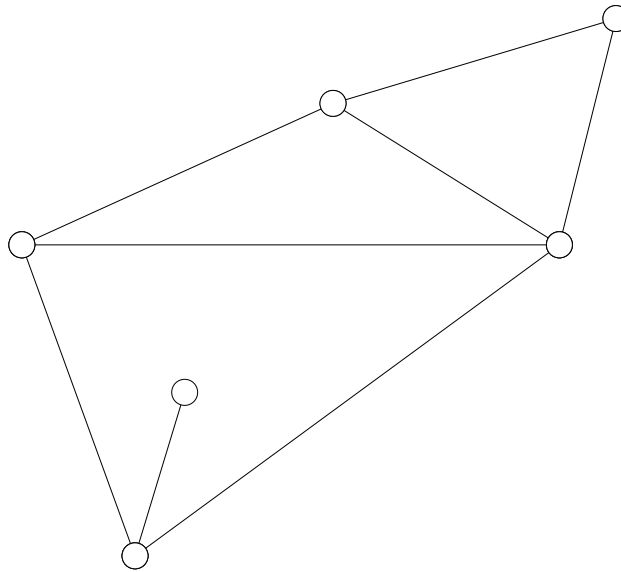
A photocopier is purchased for \$48 000. Its value depreciates by 0.5 of a cent for every copy it makes. The copier is traded in when its book value is \$8000. How many copies has it made by the time it is replaced?

- A. 80 000
- B. 8 000 000
- C. 20 000
- D. 200 000
- E. 2 000 000

Question 9

Michael wins the powerball lotto. He donates \$500 000 to his old school to be held in trust as a perpetuity that gives an annual interest rate of 3.2%. Each month the perpetuity makes a contribution to the school development fund. The value of each contribution is closest to

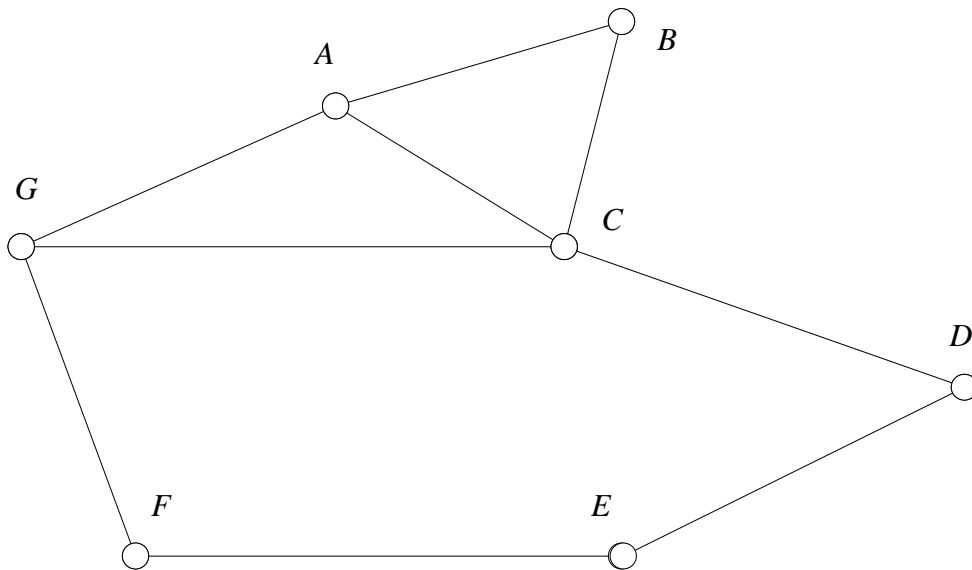
- A. \$16 000
- B. \$1600
- C. \$133
- D. \$5000
- E. \$1333

Module 5: Networks and decision mathematics**Question 1**

The sum of the degree of the vertices in the network diagram above is

- A. 14
- B. 15
- C. 16
- D. 17
- E. 18

The network diagram below relates to Questions 2 and 3



Question 2

A Hamiltonian circuit starting at A is

- A. ACDEFGABCA
- B. GCABCDEF
- C. ABCDEFG
- D. ACDEFGA
- E. AGFEDCBA

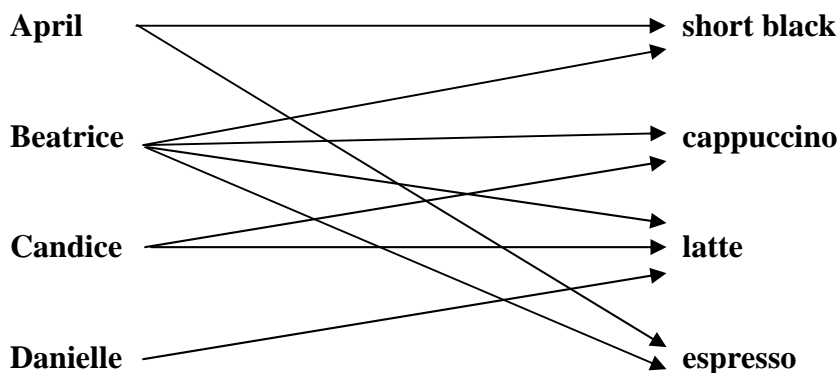
Question 3

Which one of the following statements is **not true**?

- A. The network has an Euler path.
- B. The network has 2 vertices with odd degree.
- C. The network has an Euler circuit.
- D. The network is simple and planar.
- E. The network is undirected.

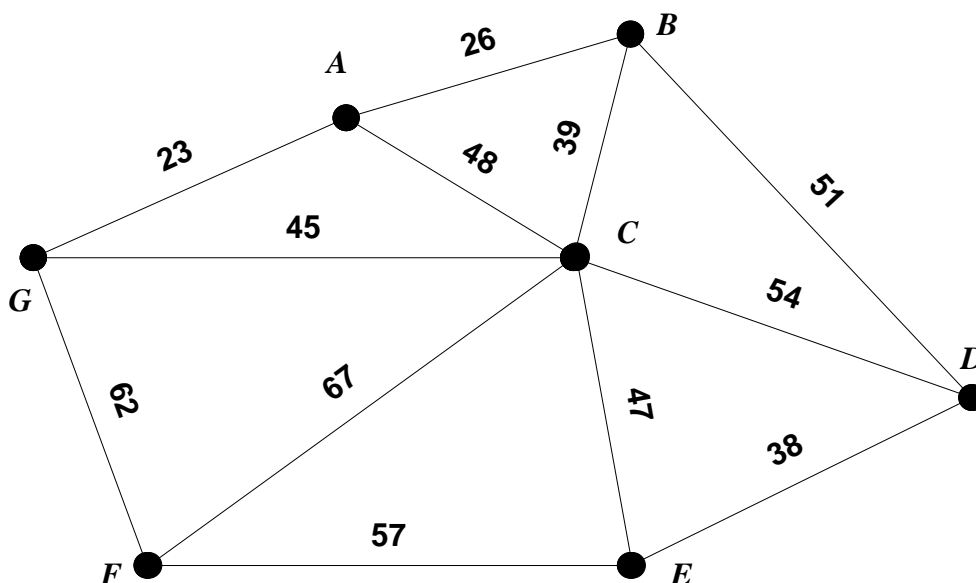
Question 4

The bipartite graph below shows the types of coffee that 4 friends like to drink.



Which of the following statements is true?

- A. All 4 friends like latte.
- B. Only Beatrice and April like short black.
- C. Candice likes cappuccino and espresso.
- D. Beatrice does not like espresso.
- E. Espresso is the most popular coffee.

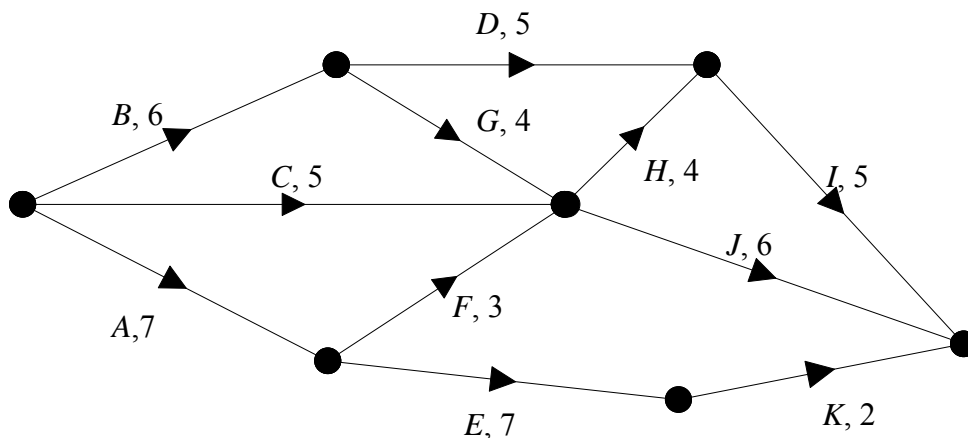
Question 5

The total length of the minimal spanning tree of the graph above is

- A. 237
- B. 239
- C. 207
- D. 252
- E. 230

Use the information below to answer Questions 6 and 7.

The network diagram below gives the time in hours for various activities to be completed in preparation for a party.



Question 6

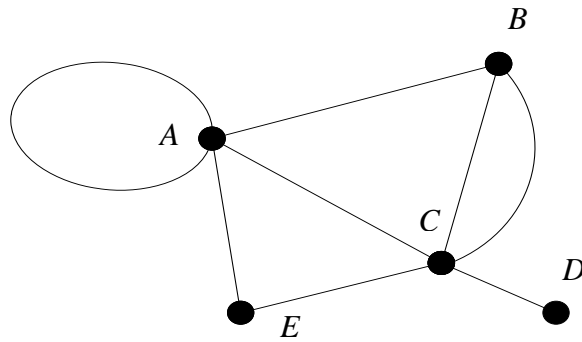
The shortest time in which all tasks can be completed is

- A. 16
- B. 11
- C. 19
- D. 54
- E. 7

Question 7

The number of hours by which activity *D* can be delayed without delaying the overall party preparation is

- A. 0 hours
- B. 1 hour
- C. 2 hours
- D. 3 hours
- E. 4 hours

Question 8

The adjacency matrix for the above graph is

- A. $\begin{bmatrix} 1 & 1 & 1 & 0 & 1 \\ 1 & 0 & 2 & 0 & 0 \\ 1 & 2 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 \end{bmatrix}$
- B. $\begin{bmatrix} 2 & 1 & 1 & 0 & 1 \\ 1 & 0 & 2 & 0 & 0 \\ 1 & 2 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 \end{bmatrix}$
- C. $\begin{bmatrix} 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 2 & 0 & 0 \\ 1 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 & 0 \end{bmatrix}$
- D. $\begin{bmatrix} 1 & 1 & 1 & 0 & 1 \\ 1 & 0 & 2 & 0 & 0 \\ 1 & 2 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 & 0 \end{bmatrix}$
- E. $\begin{bmatrix} 1 & 1 & 1 & 0 & 1 \\ 1 & 0 & 2 & 0 & 0 \\ 1 & 2 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 \end{bmatrix}$

Question 9

A connected planar graph has the same number of vertices as it has faces. If it has 14 edges the number of faces is

- A. 4
B. 5
C. 6
D. 7
E. 8

SECTION B - continued
TURN OVER

Module 5: Matrices**Question 1**

If matrix $A = \begin{bmatrix} 2 & -6 & 4 \\ 1 & 3 & 1 \\ 3 & 0 & 0 \\ 5 & -1 & 3 \end{bmatrix}$ and matrix $B = \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$, then the order of the matrix product AB is

- A. undefined
- B. 4×3
- C. 3×1
- D. 3×3
- E. 4×1

Question 2

If matrix $A = \begin{bmatrix} 2 & 3 \\ 0 & -2 \end{bmatrix}$ and matrix $B = \begin{bmatrix} -2 & 5 \\ 1 & 0 \end{bmatrix}$

then $2A - B$ is

- A. $\begin{bmatrix} 2 & 11 \\ 1 & -4 \end{bmatrix}$
- B. $\begin{bmatrix} 0 & -2 \\ -1 & -2 \end{bmatrix}$
- C. $\begin{bmatrix} 2 & 1 \\ 1 & 4 \end{bmatrix}$
- D. $\begin{bmatrix} 6 & 1 \\ -1 & -4 \end{bmatrix}$
- E. undefined

Question 3

The system of simultaneous equations

$$3z = 10$$

$$y - 2x + 2z = 7$$

$$2z - 2y = 2$$

can be solved by calculating the product of

A. $\begin{bmatrix} 0 & 0 & 3 \\ 1 & -2 & 2 \\ 2 & -2 & 0 \end{bmatrix} \begin{bmatrix} 10 \\ 7 \\ 2 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 0 & 3 \\ -2 & 1 & 2 \\ 2 & -2 & 0 \end{bmatrix} \begin{bmatrix} 10 \\ 7 \\ 2 \end{bmatrix}$

C. $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} & -\frac{1}{4} \\ \frac{1}{3} & 0 & -\frac{1}{2} \\ \frac{1}{3} & 0 & 0 \end{bmatrix} \begin{bmatrix} 10 \\ 7 \\ 2 \end{bmatrix}$

D. $\begin{bmatrix} \frac{2}{3} & -1 & 1 \\ \frac{2}{3} & -1 & \frac{1}{2} \\ \frac{1}{3} & 0 & 0 \end{bmatrix} \begin{bmatrix} 10 \\ 7 \\ 2 \end{bmatrix}$

E. undefined

Question 4

Susan purchased 3 CDs, 4 DVDs and 2 cassettes from a music store. Each CD cost \$15, each DVD cost \$18 and each cassette cost \$9. The matrix product that will give the total amount of money she spent is

A. $\begin{bmatrix} 3 \\ 4 \\ 2 \end{bmatrix} \begin{bmatrix} 15 \\ 18 \\ 9 \end{bmatrix}$

B. $\begin{bmatrix} 3 \\ 4 \\ 2 \end{bmatrix} \begin{bmatrix} 15 & 18 & 9 \end{bmatrix}$

C. $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 2 \end{bmatrix} \begin{bmatrix} 15 & 0 & 0 \\ 0 & 18 & 0 \\ 0 & 0 & 9 \end{bmatrix}$

D. $\begin{bmatrix} 3 & 4 & 2 \end{bmatrix} \begin{bmatrix} 15 \\ 18 \\ 9 \end{bmatrix}$

E. $\begin{bmatrix} 15 \\ 18 \\ 9 \end{bmatrix} \begin{bmatrix} 3 & 4 & 2 \end{bmatrix}$

Question 5

If matrix $A = \begin{bmatrix} 3 & -2 \\ 6 & -4 \end{bmatrix}$, which of the following statements is true?

- A. A is a singular matrix.
- B. A^{-1} is the inverse of A .
- C. $\det(A)$ is undefined.
- D. A cannot be multiplied by itself.
- E. A^{-1} is zero.

Question 6

If matrix $A = \begin{bmatrix} 3 & 1 \\ x & 1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$, then x equals

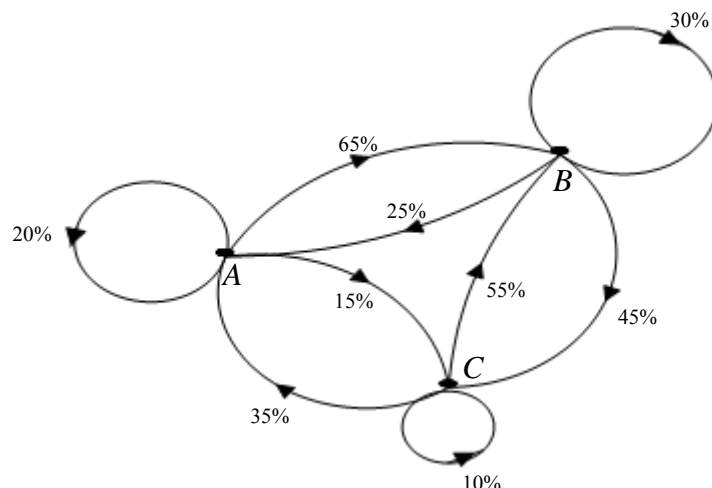
- A. 0
- B. 1
- C. 2
- D. -1
- E. -2

Question 7

80% of people who buy the *Sunday Bugle* (B) one week buy the *Sunday Bugle* the following week and the other 20% buy the *Sunday Gazette* (G). 95% of people who buy the *Sunday Gazette* one week buy the *Sunday Gazette* the following week and the other 5% buy the *Sunday Bugle*. On Sunday 30 December 2012, 30 people bought the *Sunday Gazette* and 20 people bought the *Sunday Bugle*. The number of people who bought the *Sunday Gazette* on 20 January 2013 is closest to

- A. 13
- B. 14
- C. 16
- D. 36
- E. 41

Question 8



The transition matrix that represents the above diagram is

A.
$$\begin{bmatrix} .20 & .65 & .15 \\ .25 & .30 & .45 \\ .35 & .55 & .10 \end{bmatrix}$$

B.
$$\begin{bmatrix} .20 & .25 & .35 \\ .65 & .30 & .55 \\ .15 & .45 & .10 \end{bmatrix}$$

C.
$$\begin{bmatrix} .20 & .25 & .35 \\ .65 & .30 & .55 \\ .15 & .45 & .10 \end{bmatrix}$$

D.
$$\begin{bmatrix} .20 & .25 & .35 \\ .65 & .30 & .45 \\ .15 & .55 & .10 \end{bmatrix}$$

E.
$$\begin{bmatrix} .20 & .30 & .10 \\ .15 & .25 & .55 \\ .65 & .45 & .35 \end{bmatrix}$$

Question 9

If A , B and C are matrices and the resulting matrix of $A(B - C)^2$ has the order 2×3 , then the order of matrix A must be

- A. 3×1
- B. 3×3
- C. 2×2
- D. 3×2
- E. 2×3

END OF MULTIPLE-CHOICE QUESTION BOOK